

Proceedings of the Iowa Academy of Science

Volume 32 | Annual Issue

Article 8

1925

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Recommended Citation

Sherwood, F. F. (1925) "The Influence of Carbon Dioxide upon the Quality and Keeping Properties of Butter and Ice Cream," *Proceedings of the Iowa Academy of Science*, 32(1), 59-61.

Available at: <https://scholarworks.uni.edu/pias/vol32/iss1/8>

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THE INFLUENCE OF CARBON DIOXIDE UPON THE QUALITY AND KEEPING PROPERTIES OF BUTTER AND ICE CREAM

F. F. SHERWOOD

It is quite generally believed that oxygen of the air inclosed in butter and ice cream is responsible for some of the undesirable changes taking place. If it were true that appreciable oxidation takes place due to the presence of oxygen in the inclosed air, it would be very desirable to replace the air with some other gas. Recently attempts have been made to replace the air normally incorporated in butter and ice cream by carbon dioxide gas. The work herein reported represents an attempt to determine the influence of carbon dioxide upon the quality and keeping properties of butter and ice cream.

STUDY OF CARBONATED BUTTER

The work herein reported was undertaken for the purpose of comparing carbonated and uncarbonated butter as to the following: (1) effect on the quality of the butter, (2) effect on the chemical composition of the butter, and (3) effect on the bacterial content.

METHODS

The experiments were carried on in three groups. In group I sweet cream was used, in group II the cream was ripened to serum X (0.0063) acidity, and in group III sour cream was used. Group I.

The cream used in this group of experiments was taken from the cream received at the Iowa State College Creamery. To determine the acidity of the cream an 18 gram sample was titrated against N/10NaOH, using phenolphthalein as an indicator.

The cream was pastuerized in a 50 gallon vat at a temperature of 140-145 degrees F. for 30 minutes. The cream was then cooled to 40 degrees F. and held two hours before churning.

Group II.

In group II carbonated ripened cream butter was compared with air churned ripened cream butter. The cream used was of

acidity ranged from 0.18% to 0.3%. The cream was pastuerized at 140-145 degrees F. for 30 minutes, cooled to 70 degrees F. and ripened to per cent serum X (0.0063) acidity, using from 5% to 15% starter, depending upon the rate of ripening desired. When the desired acidity was reached, the cream was cooled to 40 degrees F. and held for two or three hours before churning.

Group III.

This set of experiments was undertaken to determine the effect of carbonation upon the butter churned from sour cream. The acidity of the cream used in this group ranged from 0.40% to 0.53%.

In all of the above experiments the cream was warmed to the churning temperature and divided into two equal batches and churned separately in two small churns under the same conditions except that one batch was saturated and the churn filled with carbon dioxide gas by allowing the gas to bubble through the cream from the bottom of the churn, while the air was forced out at the top until a strong odor of carbon dioxide could be detected above the door of the churn. The door was then closed and the churns started simultaneously.

RESULTS OBTAINED

In order to determine the effect of carbon dioxide on the quality of the butter, scorings were made on the butter at definite intervals. The butter was scored when fresh, after two months storage, and after four months storage.

The scores given the butter by unbiased judges indicated very clearly that the use of carbon dioxide does not improve the quality and keeping properties of butter. A chemical analysis of the butter showed that carbon dioxide had no influence on the composition. A bacteriological examination of the butter when fresh and after three to five months storage failed to show any advantage in the use of carbon dioxide.

STUDY OF CARBONATED ICE CREAM

The object of this study was to determine the effect of carbon dioxide upon (1) the quality, (2) texture, (3) standing up qualities, (4) composition, and (5) the bacterial content of ice cream.

METHODS

The cream used for these experiments consisted mainly of that taken from the sweet grade of cream received at the college

the market milk department. The acidity of the cream was less than 0.2%.

All utensils that came in contact with the cream or mix were kept clean and always steamed before being used. The homogenizer used was a Manton-Gaulin machine of 60 gallons capacity per hour. The cream was frozen in a Miller 40-quart horizontal freezer.

The mix used in all the experiments conformed to the following formula :

42 pounds of 18% cream
8 pounds of sugar
3 ounces of gelatin
4 ounces of vanilla

This mix was pastuerized at 160 degrees F. for 10 minutes, cooled to 40 degrees F., and homogenized at 2500 pounds pressure. After homogenization, the cans containing the mix were placed in brine at 32 degrees F. and held for 24 hours before freezing.

The freezing was carried out under conditions as nearly the same as possible except that one batch from each mix was frozen and whipped in the presence of air while the other was frozen and whipped in the presence of carbon dioxide.

To determine the effect of carbon dioxide on the quality of ice cream, the cream was judged as soon as hardened and after a period of two weeks. No results were obtained to show that carbon dioxide improves the quality of ice cream. The texture, standing-up properties and chemical composition of the ice cream was not influenced by the use of carbon dioxide. The use of carbon dioxide had no influence upon the growth of bacteria.

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